April 7, 2003

Diesel Particulate Matter Filter

What is a Diesel Particulate Matter Filter?

- A diesel particulate matter filter (DPF) is a ceramic device that collects the particulate matter in the exhaust stream The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down (or oxidize) into less harmful components.

What is Particulate Matter?

- Particulate matter, or PM, is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope. Particles come from a variety of sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood.
- In addition to particulate matter (PM), diesel vehicles emit nitrogen oxides (NOx) and hydrocarbons (HC) both of which contribute to the formation of ozone as well as carbon monoxide (CO).

What are the health effects of diesel exhaust?

- The particles in diesel exhaust can penetrate deep into the lungs and pose health risks including aggravated asthma symptoms, respiratory symptoms in healthy individuals, and other health problems.
- Children are more susceptible to air pollution than healthy adults because their respiratory systems are still developing and they have a faster breathing rate.
- Fortunately there are several techniques and technologies designed to reduce diesel pollution. This fact sheet discusses diesel particulate matter filters.

What are the benefits of a DPF retrofit?

- DPFs reduce emissions of particulate matter by 60 to 90%.
- DPFs also reduce emissions of hydrocarbons and carbon monoxide by 60 to 90%.

Does the EPA verify these emission reductions?

- Yes, EPA verifies individual DPFs based on information supplied to the EPA by the DPF manufacturer. Since EPA generally receives results of testing conducted on a limited number of diesel engine models, a conservative approach is taken to establish the verified levels of reduction. In most cases the actual reductions are higher than the verified values. For a list of DPFs and other technologies that EPA has verified, visit: (www.epa.gov/otaq/retrofit/retroverifiedlist.htm). For more information about EPA's verification process, visit: (www.epa.gov/otaq/retrofit/retrofittech.htm).

How much does a DPF cost?

- DPFs for school buses currently cost between $5,000 and $10,000. The cost depends on the specific bus engine and operating characteristics, such as exhaust temperatures. Field experience suggest DPFs take about 6-8 hours to install.

What type of fuel does a DPF require?

- DPFs must be used with ultra-low sulfur diesel fuel (ULSD – 15 parts per million sulfur).
- Use of regular diesel fuel in a DPF equipped bus could eventually clog the filter. This could lead to exhaust back-pressure increases and engine damage.
- Currently, ULSD costs between 8 and 25 cents per gallon more than regular diesel. ULSD is available in many parts of the country now and will be available nationwide beginning in 2006.

Can a DPF be used on any engine?

- No. DPFs work best on engines built after 1995. Therefore, knowing the age and type of each engine in the fleet as well as the exhaust temperature is an important part of any retrofit project. These factors determine whether or not vehicles are candidates for filters.

Are there special maintenance requirements for a DPF?

- Manufactures of DPFs recommend that the device be cleaned about every 100,000 miles. Some of the PM collected does not completely oxidize and inert ash remains in the filter. After about 100,000 miles this ash should be removed by blowing or vacuuming it out. Generally this process takes no more than 3 hours.

How long does a DPF last?

- Most DPFs come with 100,000 to 150,000 mile warranty, and can last 7 to 15 years.

Where can I get a DPF?

- For more information about manufacturers of DPFs or other retrofit equipment visit: (www.epa.gov/otaq/retrofit/cont_retromfrs.htm).